Mikhail Raskin

Curriculum vitae

Personal details

Date and place of birth	21 August 1987, Moscow, Russia
Nationality	Russia
Address	University of Bordeaux, LaBRI (Bât A30),
	351, Cours de la Libération, F-33405 Talence Cedex, France
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Current position

Since 2017 Research Engineer, University of Bordeaux, LaBRI

Previous positions

Dec 2015 – Feb 2017 Postdoc, Department of CS, Aarhus University

Research interests

Expressive power and properties of programming languages. Algorithm design, combinatorial and probabilistic constructions in theoretical computer science, special computation models.

Education

2008–2014 PhD, Moscow State University, Dept. of mechanics and mathematics
    PhD thesis supervisor: Prof. Nikolay K. Vereshchagin
    PhD thesis title: Automata on infinite words: direct and semidirect products approach.
2002–2008 Master of Science, Independent University of Moscow
2003–2008 Master of Science, Moscow State University, Dept. of mechanics and mathematics (cum laude)
    MSc thesis supervisor: Prof. Nikolay K. Vereshchagin
    MSc thesis title: Partial orderings on measures on the set of infinite words over a two-symbol alphabet
1999–2003 Moscow State School N 57

Publications and reviewed conference talks

1. J. Esparza, M. Raskin, C. Weil-Kennedy. Parameterized Analysis of Immediate Observation Petri Nets. (preprint available)

2. M. Raskin, M. Simkin. Oblivious RAM with Small Storage Overhead. (preprint available)

3. M. Raskin. Population protocols with unreliable communication. (in preparation for submission)

4. K. Arnsfelt, M. Raskin. A two-player stay-in-a-set game with perfect information and without Nash equilibria. (in preparation for submission)

5. M. Raskin. A superpolynomial lower bound for the size of non-deterministic complement of an unambiguous automaton. International Colloquium on Automata, Languages, and Programming 2018, Prague, Czech Republic.

6. M. Raskin. A linear lower bound for incrementing a space-optimal integer representation in the bit-probe model. International Colloquium on Automata, Languages, and Programming 2017, Warsaw, Poland

7. M. Raskin. Writing a best-effort portable code walker in Common Lisp. European Lisp Symposium 2017, Brussels, Belgium.

8. Ivan Damgård, Jesper Buus Nielsen, Antigoni Polychroniadou, Michael Raskin. On the Communication Required for Unconditionally Secure Multiplication. *Advances in Cryptology - CRYPTO Proceedings* 2016, part 2, pp. 459–488.

9. M. Raskin, N. Nikitenkov. Paradox of choice in social network games with product choice. Game theory society congress 2016, Maastrich, Netherlands.

10. M. Raskin, N. Mamardashvili. Accessing local variables during debugging. European Lisp Symposium 2016, Krakow, Poland.

11. K. Chatterjee, M. Henzinger, S. Krinninger, V. Loitzenbauer, M. Raskin. Approximating the minimum cycle mean. *Theoretical Computer Science*, 2014, vol. 547, pp. 104–116

12. M. Raskin. Computable measures that are couplable but not computably couplable. International Conference on Computability, Complexity and Randomness 2013, Moscow, Russia.

13. M. Raskin. Data-transformer: an example of data-centered tool set. European Lisp Symposium 2013, Madrid, Spain.

14. M. Raskin. Toom's Partial Order Is Transitive. *Problems of Information Transmission*, 2012, vol. 48, N2, pp.154–172

15. M. Raskin. Lower Estimate of the Regulator of the Direct Product of almost Periodic and Periodic Sequences. *Vestnik Mosckovskogo Universiteta (MSU Bulletin)*, Series 1, Mathematics. Mechanics. 2011, v. 6

16. M. Raskin. Coupling of computable measures coordinated with an order relation is not always computable. *Vestnik Mosckovskogo Universiteta (MSU Bulletin)*. Series 1. Mathematics. Mechanics. 2012, v. 2

17. Yu. Pritykin, M. Raskin. Almost periodicity and finite automata. Workshop on Infinite Words, Automata and Dynamics 2007, Ekaterinburg, Russia.

Publications

1. J. Esparza, M. Raskin, C. Weil-Kennedy. Parameterized Analysis of Immediate Observation Petri Nets. (preprint available)

2. M. Raskin, M. Simkin. Oblivious RAM with Small Storage Overhead. (preprint available)

3. M. Raskin. Population protocols with unreliable communication. (in preparation for submission)

4. K. Arnsfelt, M. Raskin. A two-player stay-in-a-set game with perfect information and without Nash equilibria. (in preparation for publication)

5. M. Raskin. A superpolynomial lower bound for the size of non-deterministic complement of an unambiguous automaton. International Colloquium on Automata, Languages, and Programming 2018, Prague, Czech Republic.

   Unambiguous non-deterministic finite automata (UFA) are non-deterministic automata (over finite words) such that there is at most one accepting run over each input. Such automata are known to be potentially exponentially more succinct than deterministic automata, and non-deterministic automata can be exponentially more succinct than them.

   In this paper we establish a superpolynomial lower bound for the state complexity of the translation of an UFA to a non-deterministic automaton for the complement language. This disproves the formerly conjectured polynomial upper bound for this translation. This lower bound only involves a one letter alphabet, and makes use of the random graph methods.

   The same proof also shows that the translation of sweeping automata to non-deterministic automata is superpolynomial.

6. A linear lower bound for incrementing a space-optimal integer representation in the bit-probe model. International Colloquium on Automata, Languages, and Programming 2017. Warsaw, Poland

   We present the first linear lower bound for the number of bits required to be accessed in the worst case to increment an integer in an arbitrary space-optimal binary representation. The best previously known lower bound was logarithmic. It is known that a logarithmic number of read bits in the worst case is enough to increment some of the integer representations that use one bit of redundancy, therefore we show an exponential gap between space-optimal and redundant counters.

   Our proof is based on considering the increment procedure for a space optimal counter as a permutation and calculating its parity. For every space optimal counter, the permutation must be odd, and implementing an odd permutation requires reading at least half the bits in the worst case. The combination of these two observations explains why the worst-case space-optimal problem is substantially different from both average-case approach with constant expected number of reads and almost space optimal representations with logarithmic number of reads in the worst case.

7. Writing a best-effort portable code walker in Common Lisp. European Lisp Symposium 2017, Brussels, Belgium.

   One of the powerful features of the Lisp language family is possibility to extend the language using macros. Some of possible extensions would benefit from a code walker, i.e. a library for processing code that keeps track of the status of different part of code, for their implementation. But in practice code walking is generally avoided.

   In this paper, we study facilities useful to code walkers provided by "Common Lisp: the Language" (2nd edition) and the Common Lisp standard. We will show that the features described in the standard are not sufficient to write a fully portable code walker.

   One of the problems is related to a powerful but rarely discussed feature. The `macrolet` special form allows a macro function to pass information easily to other macro invocations inside the lexical scope of the expansion.

   Another problem for code analysis is related to the usage of non-standard special forms in expansions of standard macros. We review the handling of `defun` by popular free software Common Lisp implementations.

   We also survey the abilities and limitations of the available code walking and recursive macro expansion libraries. Some examples of apparently-conforming code that exhibit avoidable limitations of the portable code walking tools are provided.

   We present a new attempt to implement a portable best-effort code walker for Common Lisp called Agnostic Lizard.

8. Ivan Damgård, Jesper Buus Nielsen, Antigoni Polychroniadou, Michael Raskin. On the Communication Required for Unconditionally Secure Multiplication. *Advances in Cryptology - CRYPTO Proceedings* 2016, part 2, pp. 459–488.

   We present the following results:

   In the honest majority setting, as well as for dishonest majority with preprocessing, any gate-by-gate protocol must communicate $\Omega(n)$ bits for every multiplication gate, where n is the number of players.

   In the honest majority setting, we show that one cannot obtain a bound that also grows with the field size. Moreover, for a constant number of players, amortizing over several multiplication gates does not allow us to save on the computational work, and – in a restricted setting – we show that this also holds for communication.

   My contribution is the method of proving the communication lower bound for amortizing over several computations and the method for ruling out a good lower bound for multiplication over a large field.

9. Paradox of choice in social network games with product choice. (joint work with Nikita Nikitenkov) Game theory society congress 2016, Maastrich, Netherlands.

The definition of product choice games on social networks was introduced by K. Apt and S. Simon. In an article written jointly with E. Markakis, they considered four types of paradox of choice in such games and gave examples of three of them. The existence of paradoxical networks of the fourth type was proven only in a weakened form. The existence of so-called «vulnerable networks» in the strong sense remained an open question.

In the present paper we solve this open question by introducing a construction, called a «cascade», and use it to provide uniform examples for all four definitions of paradoxical networks.

10. Accessing local variables during debugging. (joint work with Nikita Mamardashvili) European Lisp Symposium 2016, Krakow, Poland.

Any reasonably large program has to use local variables. It is quite common in the Lisp language family to also allow functions that exist only in a local scope. Scoping rules often allow compilers to optimize away parts of the local environment; doing that is good for performance, but sometimes inconvenient for debugging.

We present a debugging library for Common Lisp that ensures access to the local variables during debugging. To prevent the optimisations from removing access to these variables, we use code-walking macros to store references to the local variables (and functions) inside global variables.

11. K. Chatterjee, M. Henzinger, S. Krinninger, V. Loitzenbauer, M. Raskin. Approximating the minimum cycle mean. *Theoretical Computer Science*, 2014, vol. 547, pp. 104–116

A fast method for finding a cycle of approximately minimal mean edge weight in a directed graph with non-negative edge weights is offered using previously known appoximate matrix multiplication methods.

My contribution is the method of finding an example of such a cycle in addition to finding the approximate length without increasing asymptotical upper bound on the run time.

12. Computable measures that are couplable but not computably couplable. International Conference on Computability, Complexity and Randomness 2013, Moscow, Russia.

13. Data-transformer: an example of data-centered tool set. European Lisp Symposium 2013, Madrid, Spain.

This paper describes the data-transformer library, which provides various input and output routines for data based on a unified schema. Currently, the areas of the library's use include storage and retrieval of data via CLSQL; processing CSV and similar tabular files; interaction with user via web forms. Using the supplied schema, the data-transformer library can validate the input, process it and prepare it for output. A data schema may also include channel-specific details, e.g. one may specify a default HTML textarea size to use when generating the forms.

14. M. Raskin. Toom's Partial Order Is Transitive. *Problems of Information Transmission*, 2012, vol. 48, N2, pp.154–172

The main result of the article is the proof of transitivity of Toom's order relation on measures on bi-infinite sequences of plusses and minuses. The relation was initially proposed as a tool to study ergodicity of cellular automata with deletions.

15. M. Raskin. Coupling of computable measures coordinated with an order relation is not always computable. *Vestnik Mosckovskogo Universiteta (MSU Bulletin)*. Series 1. Mathematics. Mechanics. 2012, v. 2

    An example is given of two computable measures on infinite binary sequences such that there is a measure on pairs of infinite sequences such that the first projection of a random pair is almost surely larger than the second one and the projections of the measure are equal to original measures, but all such measures on pairs are uncomputable.

16. M. Raskin. Lower Estimate of the Regulator of the Direct Product of almost Periodic and Periodic Sequences. *Vestnik Mosckovskogo Universiteta (MSU Bulletin)*, Series 1, Mathematics. Mechanics. 2011, v. 6

    A lower bound is proved for almost periodicity regulator of almost periodic sequence coupled with a periodic sequence. This lower bound differs from known upper bound only in a multiplicative constant of in the count of iterations of regulator of almost periodicity of original sequence.

17. Almost periodicity and finite automata (joint work with Yu. Pritykin). Workshop on Infinite Words, Automata and Dynamics 2007, Ekaterinburg, Russia.

Talks

Peer-reviewed talks

1. State complexity of complementing unambiguous finite automata. International Colloquium on Automata, Languages, and Programming 2018, Prague, Czech Republic

2. A linear lower bound for incrementing a space-optimal integer representation in the bit-probe model. International Colloquium on Automata, Languages, and Programming 2017, Warsaw, Poland

3. Writing a best-effort portable code walker in Common Lisp. European Lisp Symposium 2017, Brussels, Belgium.

4. Paradox of choice in social network games with product choice. (joint work with Nikita Nikitenkov) Game theory society congress 2016, Maastrich, Netherlands.

5. Accessing local variables during debugging. (joint work with Nikita Mamardashvili) European Lisp Symposium 2016, Krakow, Poland.

6. Computable measures that are couplable but not computably couplable. International Conference on Computability, Complexity and Randomness 2013, Moscow, Russia.

7. Data-transformer: an example of data-centered tool set. European Lisp Symposium 2013, Madrid, Spain.

8. Almost periodicity and finite automata (joint work with Yu. Pritykin). Workshop on Infinite Words, Automata and Dynamics 2007, Ekaterinburg, Russia.

Lightning talks

1. Lisp-in-the-middle: Unifying system policies as Lisp code. Lightning talk. European Lisp Symposium 2018, Marbella, Spain.

2. Lisp-in-the-middle, or I wanted a Lisp Machine and all I got was a fancy sudo. Lightning talk. European Lisp Symposium 2017, Brussels, Belgium.

3. OpenCV wrapper and form processing for Common Lisp — implementation notes. Lightning talk. European Lisp Symposium 2015, London, UK.

4. Julia: an outside view. Lightning talk. European Lisp Symposium 2014, Paris, France.

5. Screen subareas in StumpWM via tagging. Lightning talk. European Lisp Symposium 2014, Paris, France.

6. Personal software for PC: how I ended up reading email using Common Lisp. Lightning talk. European Common Lisp Meeting 2013, Madrid, Spain.

7. QueryFS: a virtual filesystem based on queries and related tools. Lightning talk. European Lisp Symposium 2012, Zadar, Croatia.

Seminar talks

- State complexity of finite automata and the effects of operations on automata. Department of Mechanics and Maths, Moscow State University, Moscow, 2018

- Clique-width based graph algorithms. Department of Computer Science, Higher School of Economics, Moscow, 2018

- Degrees of ambiguity in finite automata. Department of Mechanics and Maths, Moscow State University, Moscow, 2018

- Enumerating colourings by colour renaming. LaBRI, University of Bordeaux, Bordeaux, 2018

- A superpolynomial lower bound for the size of non-deterministic complement of an unambiguous automaton. LaBRI, University of Bordeaux, Bordeaux, 2018

- A superpolynomial lower bound for the size of non-deterministic complement of an unambiguous automaton. Department of Computer Science, Higher School of Economics, Moscow, 2017

- Oblivious RAM constructions. Department of Mechanics and Maths, Moscow State University, Moscow, 2017

- Enumerating colourings by colour renaming. GraphEn project meeting, LaBRI, University of Bordeaux, 2017.

- A linear lower bound for incrementing a space-optimal integer representation in the bit-probe model. LaBRI, University of Bordeaux, Bordeaux, 2017

- When learning works better than machine learning: Recovering damaged QR-codes with manual choice of image features to recognize. Friday talk, Department of Computer Science, Aarhus University, Aarhus, 2016

- A linear lower bound for incrementing a space-optimal integer representation in the bit-probe model. Department of Computer Science, Aarhus University, Aarhus, 2016

- Social network games. Department of Computer Science, Aarhus University, Aarhus, 2015

- Approximating the minimum cycle mean. Department of Mechanics and Maths, Moscow State University, Moscow, 2014

- QueryFS: a virtual filesystem based on queries Department of Mechanics and Maths, Moscow State University, Moscow

- Computable measures that are couplable but not computably couplable. Department of Mechanics and Maths, Moscow State University, Moscow

- Cellular automata, cellular automata with deletions and Toom's relation on measures (short series of talks). Department of Mechanics and Maths, Moscow State University, Moscow

- Goldreich's construction for secure multiparty computation (short series of talks). Department of Mechanics and Maths, Moscow State University, Moscow

- On regulator of a finite transducer image of an almost periodic sequence. Department of Mechanics and Maths, Moscow State University, Moscow

Conferences attended

1. International Colloquium on Automata, Languages, and Programming (ICALP) 2018, Prague, Czech Republic

2. European Lisp Symposium 2018, Marbella, Spain

3. International Colloquium on Automata, Languages, and Programming (ICALP) 2017, Warsaw, Poland

4. European Lisp Symposium 2017, Brussels, Belgium

5. Game theory society congress (GAMES) 2016, Maastricht, Netherlands

6. Logical foundations of game theory (LOFT) 2016, Maastricht, Netherlands

7. European Lisp Symposium 2016, Krakow, Poland

8. European Lisp Symposium 2015, London, UK

9. Games, Automata, Logic and Formal Verification (GandALF) 2014, Verona, Italy

10. European Lisp Symposium 2014, Paris, France

11. Computability, Complexity and Randomness 2013, Moscow, Russia

12. Games, Automata, Logic and Formal Verification (GandALF) 2013, Borca di Cadore, Italy

13. European Lisp Symposium 2013, Madrid, Spain

14. European Lisp Symposium 2012, Zadar, Croatia

15. Computer Science in Russia 2007, Ekaterinburg, Russia

Scholarships

2005–2008 Kolmogorov Scholarship for students in mathematical logic and theory of algorithms

Teaching experience

University of Bordeaux (2018):
 Teaching assistant: Array algorithms
Independent University of Moscow (2007–2015):
 Lecture courses: Introduction to probability theory, Set theory, Mathematical logic
 Teaching assistant: Geometry, Algebra, Mathematical analysis
Lomonosov Moscow State University (2015):
 Co-supervision of an MSc thesis project
 "Paradoxical examples of social network games with product choice"
Moscow Institute of Physics and Technology (2011–2014):
 Teaching Assistant: Mathematical logic, Algorithmic complexity.
Lecture Courses at the Summer School "Contemporary Mathematics" (2007–2018)
- "Toy examples of games";
- "Blind counting";
- "The objects that happen to exist" (probabilistic proofs of existence);
- "We cannot wait for favors from Nature" (forcing method in set theory model construction);
- "Who am I? Where am I?" (on sampling assumptions);
- A set of conventions and conventions about sets (a survey of alternative set theories);
- Cellular automata;

- Classical nonclassical logics and standard nonstandard models;
- Fortune-teller is of no use (what can and what cannot be predicted),
- Conditional probability and other probabilistic notions;
- Introduction to game theory;
- Sequences, close to periodical (with Yu.Pritykin).

Computer experience

Main languages:	Common Lisp, Python, Pascal (Free Pascal Compiler, Delphi), POSIX Shell/Bash, Nix
Other:	Julia, Scheme, C, JavaScript, OCaml, C++
System administration:	GNU/Linux servers; small networks with complicated routing

Professional programming

2008–2015	Design and implementation of web-based software systems for data collection, automated validation, unification and analysis. (MCCME)
2004–2008	Development of software systems for automated data acquisition, processing and monitoring in engineering tests. (NATI)

Contributions to open source projects

NixPkgs	import software packages to the NIX platform, minor patches to the Nix package manager
Agnostic Lizard	author and current maintainer of a code walking library for Common Lisp
StumpWM	tag-based window management code for Stump Window Manager
CL-Emb	current maintainer
RelFS	symlink generation code for Relational filesystem
FunionFS	support for dynamical reconfiguration of the union filesystem

Languages spoken

- Russian (native)
- English (advanced)
- French (good)